

WHAT IS CLAIMED IS:

1. A latching micro magnetic switch, the switch comprising:
  - a reference plane;
  - a magnet, located proximate to a supporting structure, that produces a first magnetic field with non-uniformly spaced field lines approximately orthogonal to the reference plane;
  - a cantilever, supported by the support structure, having an axis of rotation lying in the reference plane, and having magnetic material that makes the cantilever sensitive to the first magnetic field, such that the cantilever is configured to rotate about the axis of rotation between first and second states; and
  - a conductor, located proximate to the supporting structure and the cantilever, configured to conduct a current, wherein the current produces a second magnetic field having a component approximately parallel to the reference plane and approximately perpendicular to the rotational axis of the cantilever, which causes the cantilever to switch between the first and second states.
2. The switch of claim 1, wherein once switched to a one of the first and second states, the cantilever is latched in the one of the first and second states by the first magnetic field until further switching occurs.
3. The switch of claim 1, wherein the conductor and the cantilever are formed on the supporting structure.
4. The switch of claim 1, wherein the cantilever is provided between the substrate and the magnet.

5. The switch of claim 1, wherein a magnitude of the second magnetic field is smaller than a magnitude of the first magnetic field.

6. The switch of claim 1, wherein the supporting structure is positioned between the cantilever and the magnet.

7. The switch of claim 1, wherein the supporting structure is a substrate.

8. A latching micro magnetic switch, the switch comprising:  
a magnet, located proximate to a supporting structure, the magnet producing a first magnetic field with field lines symmetrically spaced about a central axis;

a cantilever, supported by the supporting structure, having a magnetic material and a longitudinal axis, the magnetic material making the cantilever sensitive to the first magnetic field, such that the cantilever is configured to move between first and second states; and

a conductor, located proximate to the supporting structure and the cantilever, configured to conduct a current, wherein the current produces a second magnetic field that causes the cantilever to switch between the first and second states.

9. The switch of claim 8, wherein once switched to a one of the first and second states, the cantilever is latched in the one of the first and second states by the first magnetic field until further switching occurs.

10. The switch of claim 8, wherein the conductor and the cantilever are formed on the supporting structure.

11. The switch of claim 8, wherein the cantilever is provided between the substrate and the magnet.

12. The switch of claim 8, wherein a magnitude of the second magnetic field is smaller than a magnitude of the first magnetic field.

13. The switch of claim 8, wherein the supporting structure is positioned between the cantilever and the magnet.

14. The switch of claim 8, wherein the supporting structure is a substrate.

15. The switch of claim 8, further comprising:  
a reference plane, wherein the symmetrically spaced field lines are at varying angles with respect to the reference plane.

16. A latching micro magnetic switch, the switch comprising:  
a magnet located proximate to a supporting structure, the magnet producing a first magnetic field with non-uniformly spaced field lines;  
a cantilever, supported by the supporting structure, having a magnetic materials and a longitudinal axis approximately perpendicular to the uniformly spaced field lines, wherein the magnetic material makes the cantilever sensitive to the first magnetic field, such that the cantilever can move between first and second states; and  
a conductor, located proximate to the supporting structure and the cantilever, configured to conduct a current, wherein the current produces a second magnetic field having a component parallel to the longitudinal axis of the cantilever that causes the cantilever to switch between the first and second states.

17. The switch of claim 16, wherein once switched to a one of the first and second states, the cantilever is latched in the one of the first and second states by the first magnetic field until further switching occurs.

18. The switch of claim 16, wherein the conductor and the cantilever are formed on the supporting structure.

19. The switch of claim 16, wherein the cantilever is provided between the substrate and the magnet.

20. The switch of claim 16, wherein a magnitude of the second magnetic field is smaller than a magnitude of the first magnetic field.

21. The switch of claim 16, wherein the supporting structure is positioned between the cantilever and the magnet.

22. The switch of claim 16, wherein the supporting structure is a substrate.